

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



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| Applicant's or agent's file reference PH-21690-PCT | FOR FURTHER ACTION | | See Form PCT/IPEA/416 |
| International application No. PCT/KR2004/001652 | International filing date(day/month/year) 05 JULY 2004 (05.07.2004) | Priority date (day/month/year) 05 JULY 2003 (05.07.2003) | |
| International Patent Classification (IPC) or national classification and IPC IPC7 C12Q 1/68 | | | |
| Applicant POSTECH FOUNDATION et al | | | |

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 4 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☐ (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box relating to Sequence Listing (see Section 802 of the Administrative Instructions).
- This report contains indications relating to the following items:
 - ☒ Box No. I Basis of the report
 - ☐ Box No. II Priority
 - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Box No. IV Lack of unity of invention
 - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Box No. VI Certain documents cited
 - ☐ Box No. VII Certain defects in the international application
 - ☐ Box No. VIII Certain observations on the international application

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| Date of submission of the demand 04 FEBRUARY 2005 (04.02.2005) | Date of completion of this report 13 OCTOBER 2005 (13.10.2005) |
| Name and mailing address of the IPEA/KR  Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140 | Authorized officer CHO, YOUNG GYUN Telephone No. 82-42-481-8132  |

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/KR2004/001652

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☒ This report is based on translations from the original language into the following language English, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☒ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☒ the international application as originally filed/furnished

☐ the description:
 pages _____ as originally filed/furnished
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____

☐ the claims:
 pages _____ as originally filed/furnished
 pages* _____ as amended (together with any statement) under Article 19
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____

☐ the drawings:
 pages _____ as originally filed/furnished
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____

☐ the sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/KR2004/001652

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|------|-----|
| Novelty (N) | Claims | 1-9 | YES |
| | Claims | None | NO |
| Inventive step (IS) | Claims | 1-9 | YES |
| | Claims | None | NO |
| Industrial applicability (IA) | Claims | 1-9 | YES |
| | Claims | None | NO |

2. Citations and explanations (Rule 70.7)

The following documents have been considered for the purpose of this report:

D1: WO 2000/068232 A1 (UNISEARCH LIMITED) 16 NOVEMBER 2000

D2: Bioconju. Chem., Vol. 13(6), pp. 1181-1185 (2002)

D3: Chem. Soc. Rev., Vol. 31(2), pp. 96-107 (2002)

D1 discloses a method for producing cucurbiturils, comprising mixing substituted and/or unsubstituted glycoluril with an acid and a compound forming methylene bridges between glycoluril units, and heating the mixture; and novel cucurbiturils and substituted cucurbiturils.

D2 discloses noncovalent strategy in developing a self-assembled ternary complex of cationic dendrimer, cucurbituril and DNA as a gene delivery carrier.

D3 discloses mechanically interlocked molecules incorporating cucurbituril as a molecular bead and their supramolecular assemblies.

1. Novelty & Inventive Step

Claims 1-6 relate to a cucurbituril derivative-bonded solid substrate, wherein a cucurbituril derivative of Formula (1) is covalently bonded to a modified solid substrate of Formula (2) or Formula (7). Claims 7-9 relate to a protein chip, a DNA chip and a sensor for biomaterial assay comprising the cucurbituril derivative-bonded solid substrate of claims 1-6.

(Continued on Supplemental Sheet.)

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box No. V

The technical feature of the present invention is the covalent bonding between the cucurbituril derivative of Formula (1) and the modified solid substrate of Formula (2) or Formula (7).

However, none of the prior art documents discloses a cucurbituril derivative-bonded solid substrate with the covalent bonding between a cucurbituril derivative of Formula (1) and a modified solid substrate of Formula (2) or Formula (7).

Said cucurbituril derivative-bonded solid substrate of this invention enables immobilization of proteins on a surface of the solid substrate via a non-covalent bond with a very strong coupling constant and gives no damage to active sites of proteins preparing a protein chip using said solid substrate. Thus, the cucurbituril derivative-bonded solid substrate would not have been obvious to a person skilled in the art from the disclosure of D1-D3.

Therefore, claims 1-9 meet the requirements of novelty and inventive step under PCT Article 33(2) and 33(3).

11. Industrial Applicability

The subject matter of claims 1-9 is considered to be industrially applicable under Article 33(4). //